Engineering Heritage Victoria

Nomination for Recognition

Engineering Heritage Australia Recognition Program

1956 Olympic Swimming & Diving Stadium

July 2016

CAPTION FOR COVER PHOTOGRAPH

This shows the North West Elevation of the Stadium as completed in 1956

Photo: Wolfgang Sievers

(State Library of Victoria picture collection)

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1.0 Introduction

In 1949 Melbourne won the right to stage the 16th Modern Olympic Games, beating by one vote Buenos Aires in the fourth and final ballot. The USA cities of Detroit, Los Angeles and Minneapolis having been eliminated in earlier ballots. The Games were to be held in November 1956, they would be the first to be held in the Southern Hemisphere, the first held outside Europe and the USA, and the first Olympic Games to be televised[1].

When Melbourne applied for the Games plans had been submitted showing a proposed Olympic precinct on the site of the Royal Agricultural Society's showground at Ascot Vale. The scheme had a main stadium to hold 70,000 spectators, a smaller stadium for diving, boxing and weightlifting with a capacity for 12,000 spectators and a swimming stadium to hold 10,000 spectators as well as residential accommodation for 4,000 athletes. As soon as it was announced Melbourne had won the rights to stage the Olympics heated debate broke out about whether this was the best site. There was also public debate on whether Japan should be allowed to compete at the Games[2]. The treatment of Australian prisoners-of-war by the Japanese was still a raw memory for many Australians. There was also concern about funding for the Games. The State Government on 5 April 1951 announced it might withdraw financial and moral support for the games because of the desperate shortage of building materials for homes, hospital and State developments.[3] These matters caused concern to the International Olympic Committee. This together with Australia's quarantine regulations preventing the importation of overseas horses for equestrian events resulted in approval for the Games not occurring until July 1952 after assurances were given that Melbourne would be ready to stage the Games and it was agreed that the equestrian events would take place at Stockholm, Sweden in June 1956.

In 1952 the Melbourne Olympic Games Committee decided that there would be architectural competitions for the main stadium located at Princes Park, Carlton and for the Olympic Swimming & Diving Stadium at Fawkner Park, South Yarra. The conditions for the competitions and the judging would be done by the Royal Victorian Institute of Architects.

Architects Kevin Borland, Peter McIntyre, John and Phyllis Murphy and their engineer Bill Irwin, submitted the winning entry for the Swimming Stadium. Robin Boyd, a member of the judging panel, lauded the design in the Press as the best in the world.[4] In the same article Professor Brian Lewis[5], the convener of assessors panel, said the pools will bring Melbourne the greatest

[1] Televising of the Olympic Games resulted in many Australians buying their first television set to watch the Games on small black and white screens. The television rights became a very large source of revenue for the International Olympic Games Committee for subsequent Games.

[2] *We don't want the Japs in the Olympics RSL,* The Argus, Sat. 12 November, 1949, p5

Japanese ban could rob us of the Games, The Argus Friday, 18 November 1949, p1

[3] '*WE MAY NOT GET THE OLYMPIC GAMES AFTER ALL',* The Argus, Friday 6 April 1951, p1

[4] The Age, Tuesday, December 30, 1952.

[5] Professor Brian Lewis was head of Melbourne University's Architecture School.

architectural credit. Professor A.J. Francis[6] described the structural method as "original and brilliant".

CONGRATULATIONS FOR THE WINNERS.—Mr. John Murphy, Mr. Peter McIntyre, Mr. W. Irwin, Mr. Kevin Borland, Mrs. Phyllis Murphy and Mr. A. W. Coles. In the background is the winning design.

Figure1: The Winners
Photo: The Age, 30 December 1952, p2

The former Olympic Swimming & Diving Stadium is of historical, architectural and engineering (technological) significance to the State of Victoria. It is of historical significance as the first enclosed swimming & diving stadium for the Olympic Games and is the only major stadium structure remaining from the 1956 Olympic Games. It played host for the diving, water polo, modern pentathlon and swimming over 9 extraordinary days in 1956 when Australia won a stunning 8 gold (14 counting the relays), 4 silver and 2 bronze medals. This medal tally heralded the arrival of Australia as a major sporting force in Olympic swimming.

It is of architectural significance as an early and influential landmark in the development of Structuralist architecture in Australia in the 1950's. The winning design was acclaimed at the time as a brilliant and original design, which would be influential in Australia and overseas.[7]

[6] Professor A.J. Francis was head of the Engineering School at Melbourne University.

[6] The Age, Tuesday, December 30,1952

[7] The Age, Tuesday, December 30,1952

The former Olympic Swimming & Diving Stadium is of engineering significance as an exemplary two-dimensional tension design, which utilised post-tensioned steel frame construction and is an early example of the use of high-strength steel in building construction.

As it is 60 years since the 1956 Olympic Games it is appropriate that the Pool receive engineering heritage recognition this year.

2.0 Heritage Assessment

2.1 Basic data

2.1.1 Item Name: - 1956 Olympic Swimming and Diving Stadium

2.1.2 Other/Former Names:
State Swimming Stadium (1957-80)
Melbourne Sports and Entertainment Centre (1983 -1998), sometimes called the Glasshouse
Lexus Centre (2002-10)
Westpac Centre (2010-15)
Holden Centre 2015-

2.1.3 Location:
Corner of Olympic Blvd and Batman Ave
Olympic Park, Melbourne, VIC 3000
Australia.
Latitude 37^0 49' 26" S Longitude 144^0 58'49" E
See page 36 for photo and map of location.

2.1.4 Address: 10-30 Olympic Boulevard, Melbourne 3000

2.1.5 Suburb/Nearest Town: Melbourne City

2.1.6 State: Victoria

2.1.7 Local Government Area: Melbourne City Council

2.1.8 Owner: Melbourne & Olympic Parks Trust

2.1.9 Current Use: Sports administration and training facility for the Collingwood Football Club

2.1.10 Former Use: Swimming and diving stadium, sports and entertainment centre.

2.1.11 Designer: Engineer: W.L. Irwin & Associates (Bill Irwin)
Architects: the partnership of Borland, Murphy and McIntyre

2.1.12 Maker/Builder: McDougall & Ireland

2.1.13 Year Started: October 1954

2.1.14 Year completed: September 1956

2.1.15 Physical Description

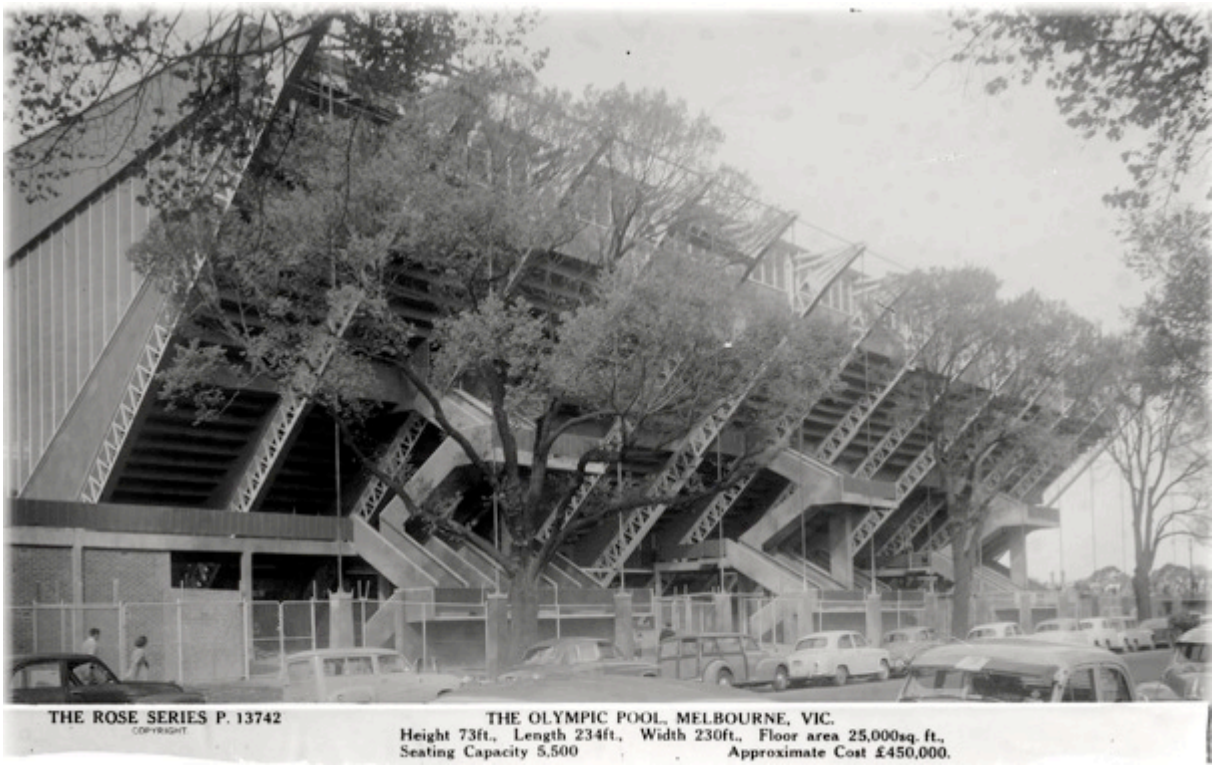

Figure 2: Stadium as built

Photo: Rose Stereograph Co., SLV picture collection

2.1.15.1 General description

The stadium, as built for the 1956 Olympic Games, consisted of 13, 5.49 m (18 foot) bays giving a total length of 71.63 m (235 ft.), a floor area of 2322.6 square metres (25,000 sq. ft.) and a clear roof span of 73.4 m. It contained a 50 m X 20 m, 8-lane swimming pool, a diving pool 15.5 m X 20 m, 4.88 m deep, and could accommodate 5,500 spectators. The total length of the swimming pool was actually 50.29 m long (55 yards) as this was the distance swum for all State and Australian swimming competitions at that time. A moveable barrier was installed to shorten the pool to 50 m for the Olympics.

The main structure consisted of lattice girders sloping outwards at 42.5 degrees to the horizontal connected to tubular trusses at the top and pinned at their bases, with vertical tension rods connected to the top of the lattice girders. The lattice girders formed the sides of the structure and supported the seating.

The structure of the building was a superb example of 'form follows function'[8] and was probably the world's first post-tensioned steel building as well as being a very early use of high-tensile steel for the building's structure.[9]

[8] The Chicago architect Louis Sullivan first used the term 'form follows function' in an1896 essay. It has since become the guiding principle of modernism architecture.

[9] Peter McIntyre in was quoted in **The Age** 9 June 1981, p21 as saying that the stadium was 'the first post-tensioned high tensile steel-framed building in Australia.'
In 2012 he has suggested that 'it was the first time in the world that post tensioned high tensile steel was used in this way.' Jeff Dowsing McIntyre's Olympic Legacy' The Footy Almanac, 5 April 2012

Figure 3: External Stairs

Photo: Wolfgang Seivers SLV picture collection

Access for spectators was by six external concrete staircases, which gave direct access to the seating at the sides of the stadium and provided additional visual interest to the side elevations. The competitors entered from the main entry at the front of the stadium, thus avoiding contact with the spectators.

The west and east walls had full height, steel-framed curtain walling hung from the underside of the end trusses. Highlight bands of glazing above the seating on the other two sides ensured that the stadium was bathed in natural light. A podium along the west side allowed spectators to look into the pool as they were approaching it.

Figure 4: Glazed west wall
Photo: Wolfgang Seivers SLV picture collection

2.1.15.2 Wind tunnel testing of the structure

Because of the unusual shape of the building tests were carried out in a wind tunnel on a 1/60 scale model[10]. The main effects of the transverse wind loads were on the design of the truss diagonals, which under dead and live loads were in tension but under wind load some reversal of stress occurred. To cater for longitudinal wind loads the two end bays were braced between the top and bottom chords of the trusses and two other bays were braced between the bottom chords of the trusses (see photo in Section 8).

2.1.15.3 Trusses

The fourteen roof trusses have spans of 73.4 m (240 ft. 9.5in.) between pins, a maximum depth of 6.1 m (20 ft.) and each truss has 20 internal panels of approximately 3.66 m (12 ft.). The chord members of the trusses were fabricated from grade 20 high tensile seamless tubing (B.S.1775:1951) with a tensile working stress of 165.5 Mpa (12 ton/sq.in.) The chord members have an outside diameter of 216 mm. and varying wall thicknesses of 9.5mm, 7.9 mm and 6.35 mm. The web members were fabricated from grade 13 tubing having a tensile working stress of 110.3 Mpa (8 ton/sq.in.). At each end of the trusses there are box sections made from mild steel plates,which fit inside the top of the raking girders and are connected to them with 101.6 mm (4 in.) mild steel pins. (see photo in Section 8). The trusses were designed to take the lateral forces applied by the girders, to prevent them falling outward, as well as the forces from the tension rods. This resulted in equal tensile forces being applied to both chords, in effect prestressing them, which enabled a a very economical span/depth ratio of 12 to be used for the trusses. Because the chords of the trusses were prestressed and because of the use of high-strength steel the trusses weighed only 89.3 kg/m (60lb./ft.), half the weight of steel that would have been required for mild steel trusses carrying the same loads for the same spans without prestressing.

[10] *Olympic pool model in wind tunnel* The Age, 6 October, 1954,p8

2.1.15.4 Girders

The lattice girders are 23.16 m (76 ft.) long from pin to pin. They were fabricated from 381 mm. x 101.6 mm. (15in. x 4 in.) channels spaced 1.07 m (3ft. 6 in.) apart. The lattice bracing consists of 76.2x76.2x12.7 (3x3x$^{1}/_{2}$) angles at the base gradually reducing in size to 50.8x50.8x4.75 (2x 2x $^{3}/_{16}$) angles at the middle of the girders and then increasing in size to 63.5x63.5x9.5 ($2^{1}/_{2}$ x$2^{1}/_{2}$x $^{3}/_{8}$) angles at the top. The lower ends of the girders are reinforced with side plates and cross stiffeners to take the loads to 127 mm. diameter pins. Welded brackets bolted to the triangular framed, reinforced concrete, footings take the 121.9 tonne (120 ton) maximum loads from these pins. The top of the girders terminate with 44.5 mm ($1^{3}/_{4}$") plates between the channels, to which are welded angled, stiffened plate sections to connect to the ends of the trusses and the tension rods (see photo in Section 8).

2.1.15.5 Tension rods

Originally it was proposed to use smaller high tensile rods but the difficulty of getting adequate connections at the ends of the rods and because larger movements would have resulted due to their small cross-ection when out-of-balance loads were applied to the stadium, the decision was made to use larger mild steel sections connected to heavy springs at their bases.

The rods are 50.8 mmx 50.8 mm (2 in.x 2 in.) mild steel, the springs have a load capacity of 25.4 tonnes (25 tons) and impose a tensile load of 15.24 tonnes (15 tons) on the rods. This load in turn applies a load of 8.33 tonnes to each truss chord. The spring loading is checked every 5 years.[11] The springs are connected to a continous inverted T-beam footing that together with the dead load of the soil above it has sufficient mass to resist the uplift forces. The springs are housed in pits at the base of each tension rod, which are filled with water topped by a layer of oil to protect them from corrosion.[12] Under maximum out-of-balance loading the pretensioned rods allow the the building to sway a maximum of 25.4mm (1 in.)

2.1.16 Physical Condition

Despite three modifications the main stadium is still in excellent condition with the envelope of stadium still intact and its iconic structure able to be appreciated. The interior of the building has been extensively altered , the main pool no longer exists, the diving pool has become a small lap pool with an adjoining spa pool. The external stairs are no longer used and access to them has been cut off. Settlement of some of the external stairs took place when the City Link tunnel began to leak water in 2000 causing the ground to subside.

2.1.17 Modification, Dates and Name Changes

[11] Information from Phil Gardiner, Managing Director-Irwinconsult Pty. Ltd.

[12] Ditto

2.1.17.1 First modification 1979-83 :Melbourne Sports & Entertainment Centre (The Glasshouse)

Figure 5: Enclosure of stairwells and airconditioning ducts
Photo: www.mopt.com.au/about/history/holden-centre

Concern about the viability of the stadium and plans to build a new State Swimming Centre on Batman Avenue led to the stadium being refurbished as a sports and entertainment centre between 1979-83. The Public Works Department were the design and construction authority. Kevin Borland (Borland & Brown), one of the original architects for the stadium was engaged to prepare the architectural plans and Bill Irwin's firm Irwin , Johnston & Partners undertook the structural design. The construction of the modifications were undertaken by McDougall & Ireland, the same firm that had built the original building.

The pools were covered with concrete slabs that supported an 'air-thrust' timber floor measuring 71 m by 29 m, to enable basketball and other sports to use the area. The glazing to the end walls was removed and replaced with solid panels consisting of acoustic insulation on the inside and opaque glass on the outside. To further improve the acoustics a new ceiling with acoustic baffles was installed. Retractable bleacher seating for 2,250 people was installed at the west end and a demountable modular stage at the east end of the building together with a space frame to take lighting and 14 tonnes of speakers for pop concerts. Each of the external stairs were enclosed by steel frames to take air-conditioning units, with ducts from these units projecting through the sides of the building.

This framing and ductwork detracted significantly from the external appearance of the building. To take the extra loads on the roof trusses from the ceiling, ducts and lighting a new 'transfer' truss was connected to the centre of all of the existing trusses enabling load sharing between adjacent trusses.[13] Despite this some additional strenghtening of the trusses had to be undertaken. Extensive change rooms and a medical centre were built below the existing concourses.

At the completion of the $10.5 million refurbishment in mid-1983 there were mixed responses to the work. The Age's architectural critic Norman Day described it 'as a pale replica of its former self', noting that ' the tension of the frame and ties, the tautnessof the building has been compromised by towers around the stairs and another skin of steel braces and columns. A clever butterfly entry porch has ruined the western end of the building.'[14]

2.1.17.2 Second modification: The Lexus Centre 2002-2010)

In the late 1990s the soon-to-be-defunct Melbourne Sports & Entertainment Centre was offered to the Melbourne Football Club for use as a training and administrative headquarters. The high cost of adaption caused the offer to be rejected. The Collingwood Football Club then took up the offer and the building was refurbished for joint use by the Club and the Victorian Institute of Sport (VIS). Kane Constructions undertook the work as a design and construct contract for the fixed sum of $15 million. Peter McIntyre was engaged to design and supervise the project with Peddle Thorp Architects and Spowers Architects being responsible, respectively for the specific fit-outs for the Collingwood Football Club and VIS. Bill Irwin's firm, now Irwinconsult Pty Ltd again undertook the structural design for the alterations.

McIntyre's overall design concept was to return the exterior of the building to something as close as possible to its original form. Much of the fabric added for the 1st modification was removed including the glazing infill to the exterior stairwells, the overscaled airconditioning ducts and the opaque panels to the end walls, which was replaced with clear glazing (thus restoring the building's original feeling of transparency). The butterfly-roofed entry foyer and the backstage areas were demolished and more discrete single-storey flat-roofed additions were built on all four sides of the building. Internally the main public arena was upgraded to include a multi-use sports court, an open plan gymnasium and an 80 m. running track, The diving pool at the east end had its covering slab removed and was turned into a 25 m. lap pool and spar. Part of the original swimming pool space, below floor level, was turned into a basement theatrette. The seating tiers were retained virtually unaltered and the spaces beneath refurbished to accommodate a fuction room with a commercial kitchen and office space. The building reopened in late 2004 as the Lexus Centre- named after the club's principal sponsor.

[13] The transfer truss is painted yellow to distinguish it from the lateral trusses that are painted blue to comply with the article 20.2 of the Burra Charter, where any changes in an historic building can be distinguished (see photo in Section 8).

[14] *Look what they've done to our pool,* The Age, 19 July 1983, p20

Figure 6: 25 m. lap pool and hydrotherapy pools
Photo: David Beauchamp

2.1.17.3 Third modification: The Westpac Centre 2010-2015

In November 2009 the Collingwood Football Club announced that Lexus would not maintain naming rights for the venue and at the beginning of 2010 it was re-badged as the Westpac Centre. In November 2011 the club became sole tennant when VIS relocated to a new purpose-built sporting complex at Albert Park. After receiving a $10 million grant from the Federal Government in May 2012 the Collingwood Football Club announced it would spend $36 million upgrading the Westpac Centre precinct.[15] Part of the money was to transform the adjacent Olympic Park running track into an MCG-sized training ground for Collingwood's exclusive use. The rest of the money was to upgrade and expand the facilities at at the Westpac Centre and, with the federal grant, provide a community centre.

The architects for this upgrade were Croxon Ramsay and Peddle Thorp Interior Design, the project manager was Coffey Projects and the interior construction and facilities upgrade was undertaken by Schiavello. Peter McIntyre was not involved with this modification but Irwinconsult remained as the engineers for the project.

The main area was refurbished to provide a new full-size netball court, warm and cold hydotherapy pools and a new mezzanine level to provide an enlarged gymnasium. A dedicated room for altitude fitness was constructed, the existing reception area was refurbished and new facilities provided for players, administrative, medical and support staff. A new Collingwood social club with dining room faclities was built at the eastern end of the building to look out over the training ground. It is connected to the existing building by a corridor and is called the Glasshouse Eatery.

[15] *Collingwood Football Club's $10 million federal government grant compared with 'sports rort affair'* Herald Sun, May 26,2012

Figure 7: The Glasshouse Eatery
Photo: David Beauchamp

2.1.17.4 Holden Centre 2015-

On the 19th of August 2015 it was announced that Holden had signed a multi-million dollar, 3 year deal with the Collingwood Football Club to become the premier partner and have naming rights for the club's headquarters.

2.1.18 Historic Notes

After all the controversy about the site for the Olympic Games in March 1952 it was finally decided that the main Olympic Stadium would be erected in Princes Park, Carlton on the site of the existing Carlton football ground, with the Swimming and Diving Stadium in the same vicinity.

2.1.18.1 Competion for main stadium

In June 1952 the Royal Victorian Institute of Architects (RVIA) wrote to the chairman of the Olympic organising committee recommending that an architectural competition be held to select the architect to design the main stadium for the Games. The RVIA was asked to organise the competition which was open to all architects registered in Australia (including those living overseas). 110 entries were received from all Australian States and the United Kingdom. One of the entries was from a six-group team comprised of recent graduates Peter McIntyre, Kevin Borland, John and Phyllis Murphy, together Robin Boyd (Roy Grounds was originally part of the group but withdrew before their entry was submitted). In mid-October the first prize was awarded to Melbourne architect Frank Heath.[16] Because of cost concerns the main stadium at Princes Park was never built, the Melbourne Cricket Grounds trustees, after many refusals, finally agreed to allow the MCG to be used as the main stadium. To do this an old stand was demolished, the new Olympic stand built at the cost of £700,000 (demolished in 2002) and the

[16] The Advertiser. Tuesday 21 October 1952, p1.

ground leveled to allow the athletic track to be laid. The architect, Frank Heath, was paid £42,000 of his £66,000 fee for the work he had already done on the stadium design.[17]

2.1.18.2 Pool site and competion

In June a four-man special committee was appointed to finalise the site of the pool and prepare a brief. It was resolved that the stadium should be a fully enclosed structure containing an Olympic size swimming pool and a separate diving pool, with an operable floor so that it could be used for other indoor events and be able to accommodat 6,000 spectators. The cost was to be a maximum of £350,000, including an allowance of £60,000 for plant and equipment. Debate erupted about whether Princes Park was the best site and by early October Fawkner Park, South Yarra was chosen. On the 15 October 1952 the RVIA announced a competition to design the stadium, The closing date for entries was the 17 December 1952. Again the competition was limited to architects registered in Australia.

The judging panel consisted of five architects, an engineer and a builder. The architects were RVIA president Eric Hughes, Professor Brian Lewis head of the Architecture School M.U., MCC Architect Bernard Briggs, Robin Boyd and Frederick Romberg. The engineer was Professor Francis from the Engineering School and the builder was Cyril McDougall from the Master Builders Association of Victoria.

2.1.18.3 The winning entry

On Wednesday 24 December the front page of the Herald announced ***Pool stadium will be ultra-modern,*** **Design that won is all-Victorian.** There were 72 entrants in the competition, half of whom were from Sydney. The winning team were architects Kevin Borland, Peter McIntyre, John and Phyllis Murphy, associated with Bill Irwin from the firm of J.L. & E.M. Daly.[18] Four other prizes of £400 each were awarded to; Mussen, McKay and Potter of Melbourne, Stephenson and Turner of Melbourne, Stephenson and Turner of Sydney and George Molnar, well known Sydney caricaturist and professor of architecture at Sydney University.

The jury's decision was unanimous . The chair, Brian Lewis, described the scheme as 'one out of the box' and added that 'it is, in addition to being the most economical one submitted, was by far the most brilliant and original.'[19] Robin Boyd stated that 'this is a modern building in every sense of the word, utilizing advanced engineering principles and expressing them vigorously with confidence and no compromise with traditional forms.'[20] The only dissent about the design was from Percy Everett, the chief architect of the Victorian Public Works, declaring that it was structurally impossible to build the pool and he almost had his way, but Professor Francis stood firm in supporting the jury's decision.[21] The chairman of the Games organising committee, (Sir) Wilfred Kent Hughes, hated the design and refused to meet any of the winners.[22]

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[17] The Advertiser, 5 February, 1953, p3

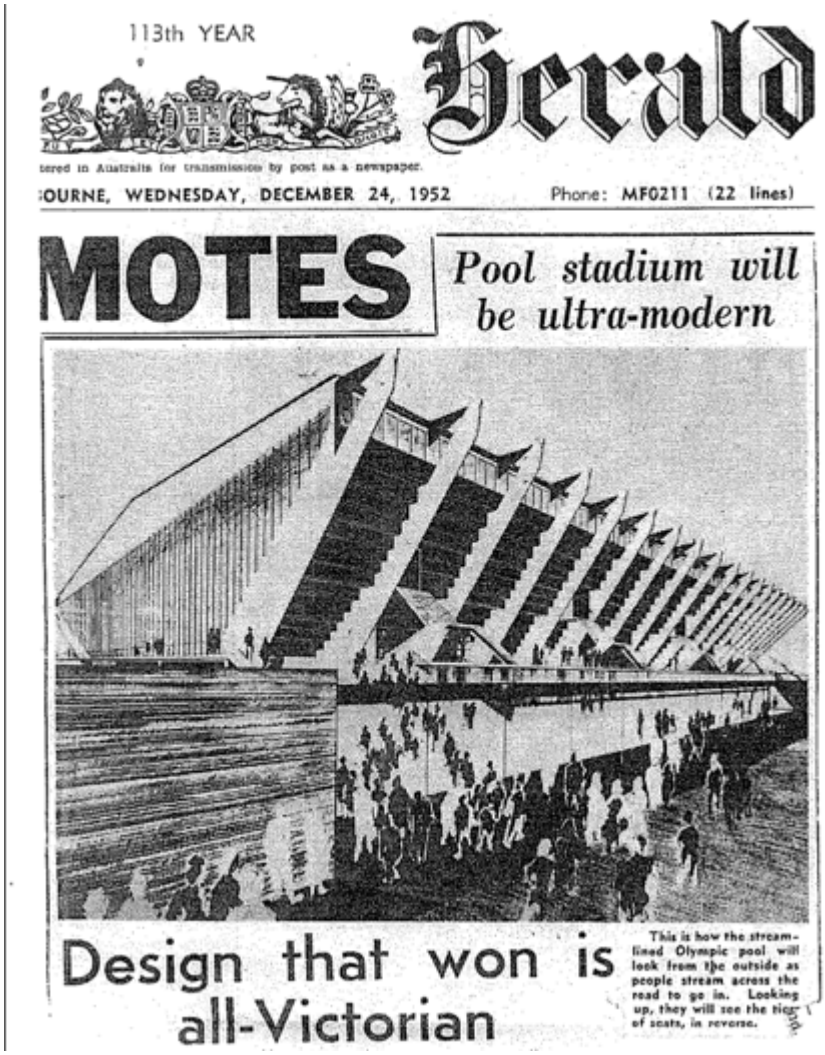
[18] The drawings of the winning entry are in the appendices

[19] 'The Olympic swimming pool', Building, Lighting & Engineering, 24 December 1956,p25.

[20] Ibid

[21] *Robin Boyd a Life* Geoffrey Searle, p148

[22] Letter to Neil Clerehan from Robin Boyd, late December 1952



113th YEAR

Herald

tered in Australia for transmission by post as a newspaper.

OURNE, WEDNESDAY, DECEMBER 24, 1952 Phone: MF0211 (22 lines)

MOTES

Pool stadium will be ultra-modern

Design that won is all-Victorian

This is how the streamlined Olympic pool will look from the outside as people stream across the road to go in. Looking up, they will see the tiers of seats, in reverse.

Figure 8: Herald front page,
Photo: Herald, Wednesday December 24, 1952

All four architects[23] had been at Melbourne University's School of Architecture in 1948 under the recently-appointed foundation Professor of Architecture, Brian Lewis. John and Phyllis Murphy (nee Slater) and Peter McIntyre were all in the same year of the course and Kevin Borland was a year below them. After graduation they remained friends. In 1951 Borland & Mcintyre opened a joint office in the basement of 1 Drummond Street, Carlton. The two young architects soon became friendly with a like-minded young engineer William (Bill) Lyle Irwin who was employed by J.E. & E.M. Daly, whose structural consultancy occupied the ground floor of the same terrace house.

[23] See Appendix 1 for biographies on the architects and Bill Irwin

2.1.18.4 The concept for the design

The four architects came up with their winning design after discussing, in the Murphy's office on a Sunday afternoon, whether they could design a building which expressed the form of the main elements: the swimming and diving pools, the sloping spectator seating and the roof.[24] Peter McIntyre said another significant factor that influenced the intial concept for the stadium design was the lectures that he and John Murphy had attended in which engineer Norman Mussen[25] taught them to analyse the stresses in buildings and look at ways to reduce them and hence the quantity of material needed by balancing the forces. Post the Second World War there was a great shortage of building materials, any method that could reduce the amount of material needed and hence the cost for the stadium would make their design proposal more attractive. According to Peter McIntyre he and Kevin Borland discussed these ideas with Bill Irwin at lunchtime and he was invited to join the team. After two meetings and a lot of talk, Bill Irwin said he would need some time to seriously consider the design. After about a week he told the team he had the solution for the structural design and drawings for the submission could start. The night before the close of the competition John Murphy worked all night to produce the perspective of the stadium, which was submitted with the rest of the plans for the stadium next morning. This was the perspective featured on the front page of the 24 December1952 Herald.[26]

2.1.18.5 The design team

As soon as the result of the competition was announced the four architects entered into partnership together and rented office space at 441 St Kilda Road, adjacent to the proposed pool site in Fawkner Park. An office was also provided for Bill Irwin who resigned from J.L. & E.M. Daly to set up his own practice, W.L. Irwin & Associates.

2.1.18.6 Final location, plans & tenders

On 10 February 1953, the Premier, John Cain, granted authority for the work to proceed and the team was instructed to prepare full working drawings within about four months. In May 1953 it was announced that the swimming stadium would not be erected in Fawkner Park because of concerns about alienation of parklands and the destruction of 80-year old avenues of elm trees. On 20 May the architects were instructed to stop work until a new site was found.

On 28 May it was announced that the new site would be Olympic Park near the Swan Street Bridge.[27] Because of a cut back to the budget for the project the length of the stadium was reduced from 98.7 m (324 ft.) to 71.3 m. (234 ft.) reducing the number of bays from 18 to 13. This necessitated reducing the length of the diving pool from 30m to 15.5 m otherwise the design remained largely intact. The final plans for the pool were approved by the Organising Committee on 20 January 1954. Work began on clearing the site towards the end of February. Two months later the architects published a notice in the press 'inviting registration by intending tenderers for the erection of the Olympic Swimming and Diving Pools, Olympic Park Melbourne,

[24] Recollections of preparing a submission for the 1956 Olympic pool competition, Phyllis Murphy October 2014.
[25] See Appendix 1 for details of Norman Mussen
[26] Recollections of preparing a submission for the 1956 Olympic pool competition, Phyllis Murphy October 2014
[27] *Olympic Park fixed as Games pool site*, Argus, 28 May 1953, p1. See also *Kevin Borland: architecture from the heart,* p114 second para.

on behalf of the Olympic Organising Committee for the XVIth Olympiad'.[28] On the same day the electrical & mechanical consulting engineers W.C. Jewell placed a notice seeking tenderers for the electrical & mechanical services and for the filtration equipment. Tenders were called on 8 May and closed on 21 June. It was announced in The Age 24 June,1954 that the tender for the stadium had been awarded to McDougall & Ireland for the sum of £292,000 (this was the lowest of 5 tenders submitted) and L.R. Moss Pty Ltd had won the tender for the electrical, mechanical and filtration work, with a bid of £9,900. The contract for the stadium's construction was formally signed on 23 July.

2.1.18.7 Construction of the stadium

Before the tenders for the stadium were signed work having already started on site to excavate the foundations for the building. During excavations a spring, from an unknown source, was discovered, which intially flowed at the rate of 60,000 gallons per hour (273 cu.m./hr) and threatened progress on the project. The problem was overcome and the excavation and pouring of footings continued.

2.1.18.7.1 Steelwork fabrication and erection.

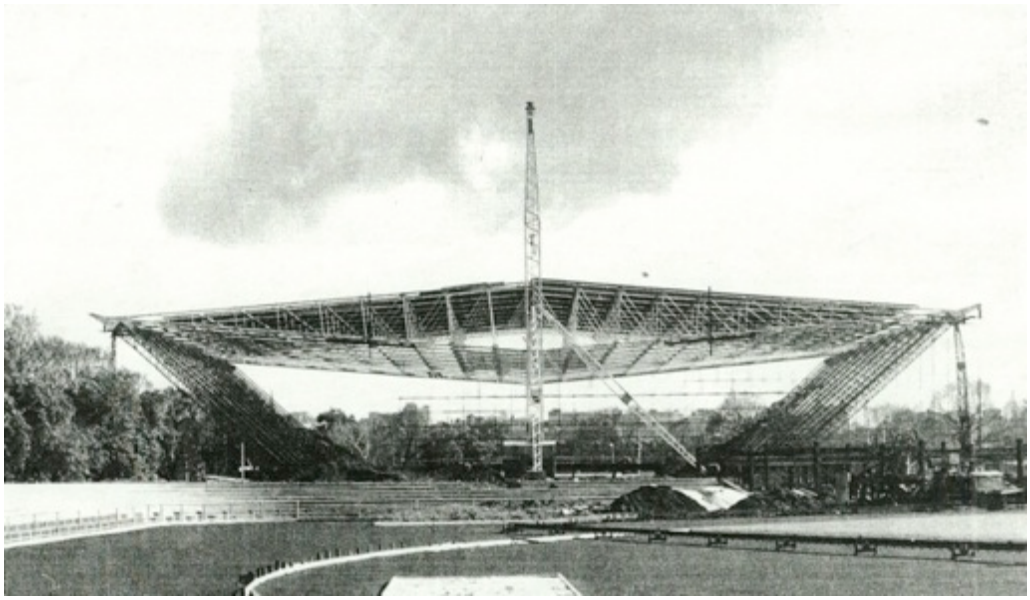


Figure 9: Steelwork erection
Photo: Commercial Photographic Company Pty Ltd, SLV picture collection

Stewarts & Lloyds (Austalia) rolled the specially-made, high-tensile circular hollow sections for the roof truss chords at their Newcastle mills. Each tube was rolled to the exact length needed for the trusses, the ends were bevelled ready for butt-welding and each tube tested to ensure that it met the requirements of B.S. 1755 (1951) and 449 (1953)

[28] 'Tenders, contracts' Argus, 21 April 1954, p12

The trusses were fabricated in one piece at Tubewrights factory at Fishermens Bend and then broken into three sections and delivered to site where they were welded together. The use of Grade 20 H.T. steel for the chords required preheating to 200^0 C prior to welding, with backing rings used to ensure there were full-penetration butt welds. Web members were profile cut to fit the chords and fillet welded to them. Where local stresses were high the joints were reinforced with triangular infill gussets welded between the intersecting members.

The girders were manufactured by Johns & Waygood Ltd at their City Road, South Melbourne factory and were delivered to site in one piece ready for erection.

Steelwork erection started in April 1955. The process was that pairs of lattice girders were laid horizontally and the lower pins fitted before being rotated into place on each side of the building to be supported by temporary scaffolding. The tension rods, after been stiffened with 150x150 mm timber, were lifted into position and connected to the ends of the girders. The connecting truss was then lifted into place and joined to the ends of the girders with steel pins that had been refrigerated overnight to make it easier to fit them into place. The tension rods were then bolted to the plates in the continuous footing. This whole operation took about two hours. As soon as a pair of trusses were in place purlins were installed to stabilise them. By October 1955 the steelwork was virtually complete and work had begun on the roofing and the concrete plats for the seating.

By early November the roofing, consisting of asbestos-cement corrugated sheeting supplied by Tasbestos Goliath & Portland Cement, was complete and work started on the excavation of the two pools.

2.1.18.7.2 The glazing

The glazed east and west walls allowed light to flood into the stadium and at the west end an external walkway at first floor level enabled spectators to look into the building (see photo in section 8). The walls were true curtain walls, the mullions hung in tension from the end trusses and had slotted connections at their bases to allow for any vertical thermal movement. This was an early use of curtain walling in Australia.[29]

2.1.18.7.3 The pools

The swimming and diving pools were constructed from 203.2 mm (8In.) reinforced concrete slabs connected using a complex jointing system. The interior of the pools were coated with an epoxy-based paint 'Epikote, with the verges and other areas above water level tiled with white ceramic tiles 152.4 mm (6 in.) square. There were some discussions on whether water from the underground spring discovered during the excavations could be used to fill the diving pool but it was decided to fill both pools with water from the nearby Yarra River, which was continuously circulated and purified by filtration, chlorinated, and heated to 22.2^0 C (72^0F).

[29] ICI House (now the Orica building), completed in 1958, was one of the 1st commercial high-rise buildings in Australia to be clad with fully glazed curtain walling.

Underwater lighting supplied by Crompton Lighting was installed in what was described as 'a most difficult and tricky operation.'[30]

The diving pool was 4.88 m (16 ft.) deep at the centre, sloping to 3.35 m (11 ft.) at the sides; the surface was agitated by compressed air released from the base of the pool. The surface of the diving pool was 1 m. lower than that of the swimming pool, which meant that spectators in the lower seats could not see the divers entry into the water. The diving tower was made from steel circular hollow sections with diving boards at 1, 3, 5 & 10 metres. Before the pool was completed there was concern that as the tower was, for the first time in the Olympics, inside a building the tower divers would face a mental hazard every time they dived as 'the top of the tower is too close to the roof- the water is not deep enough- and the pool is not long enough'. [31] When the diving pool had its official test on 24 September, 1956 the Argus reported 'there is nothing wrong with the diving pool'.[32]

Figure 10: Diving from the 10 metre tower
Photo: Herald

2.1.18.7.4 Seating

The concrete plats for the tiered seating rise at an average angle of 33 degrees and are supported by the lattice girders, except at the lower level where they project 5 m past the ends of the girders and are supported by concrete spine walls. As the slope of the girders is steeper than the seating the line of the seating starts level with the underside of the girders at the top and then comes above the girders at their base. The formwork for the plats was supported by temporary joists that ran between the girders eliminating the need for high temporary

[30] Advertisement for Crompton Lighting, Architecture & Arts, June 1957, p48.

[31] *Whew! that Games diving pool,* The Argus, Friday 8 July, 1955 p21, Judy Joy Davies

[32] *This will show the Games pool knockers,* Tuesday 25 September 1956, p16, Judy Joy Davies.

scaffolding built up from the ground. 5,400 steel bucket seats , supplied by Mackay Massey-Harris, were installed on top of the plats.

2.1.18.7.5 Completion

On 4 September 1956 it was announced that the stadium was finally completed and on the 24 September there was the first official test of the diving and swimming pools. The only critisism being that the heated pool was hotter than some Australian swimmers were used to. At the end of October the Australian Olympic swimming trials were held at the stadium, with Murray Rose setting a new world record for the 400 metres of 4minutes 27 seconds.[33]

2.1.18.8 The Games

Despite the 16th Olympiad being dubbed the "Friendly Games" a number of nations chose not to compete. Because of the invasion of the Suez Canal zone, by the United Kingdom, France and Israel in October 1956, Egypt, Iraq and Lebanon withdrew from the Melbourne Olympics. In protest against the Soviet Union's crushing of the Hungarian Revolution the Netherlands, Spain and Switzerland also did not participate. Less than two weeks before the opening ceremony, the People's Republic of China chose to boycott the event because the Republic of China had been allowed to compete.

The Opening ceremony for the **Games of the XVI Olympiad** was held at the MCG on 22 November to full capacity crowd.

Figure 11: Opening ceremony at the MCG
Photo: Herald Sun 22 December, p1

[33] The Canberra Times, Monday 29 October 1956 p5.

The first Olympic event held at the swimming and diving stadium was the 300-metre swim for the Modern Penthalon, which took place on Tuesday 27 November. The next day the preliminary heats of the water polo occurred and on Thursday 29 November the swimming started.

In the swimming events Australia won all of the freestyle races for both men and women and collected eight gold (14 counting the relays), four silver and two bronze medals, making Australia the top swimming nation at the Games. Jon Hendricks and Dawn Fraser set new world records in their events and Murray Rose became the first male swimmer to win two freestyle events since Johnny Weissmuller (Tarzan) in 1924. In the diving no Australian diver won a medal.

The most dramatic event that took place was the '**Blood in the Pool'** incident during the water polo semi-final match between Hungary and the Soviet Union. On 4 November the Soviet Union had invaded Hungary to put down the revolt against the Communist Hungarian government and by 10 November the revolt was brutally crushed.

The tension arising from this event lead to the water polo match between the two national teams becoming a bloodbath with players attacking each other until the referees halted the match. Hungary was declared the winner 4-0 and went on to win the gold medal beating Yugoslavia 2-1.

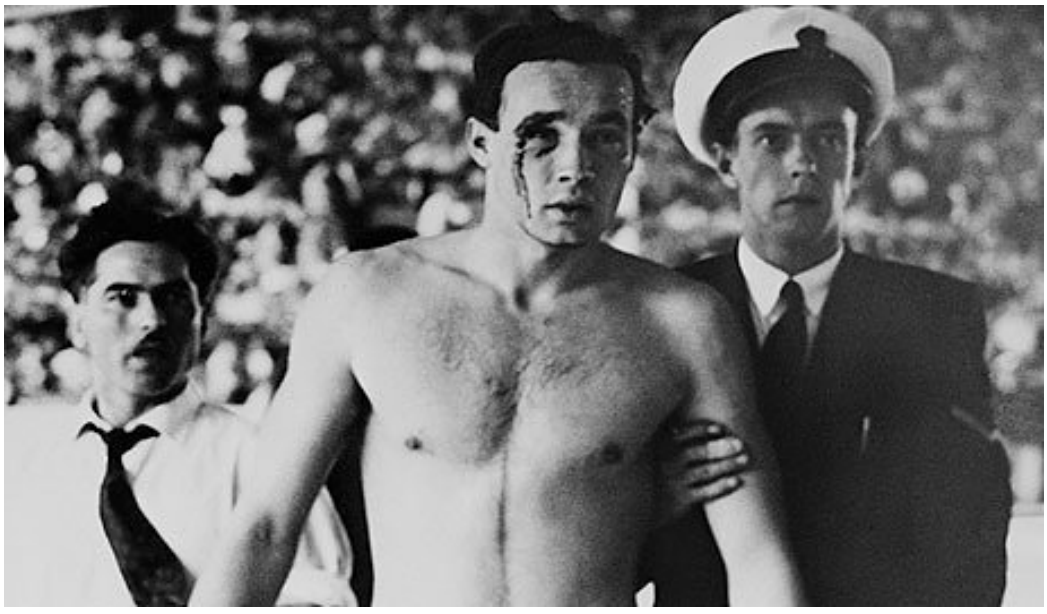


Figure 12: Ervin Zador escorted from the pool
Photo: Bettmann/Corbis

Ervin Zador, Hungary's 21-year-old water polo star was escorted from the pool with blood pouring from a cut beneath his right eye in the second half of the match against the Soviet Union.[34]

[34] The Argus, Friday 7 December, 1956, p1

The incident, together with the above photo made headlines around the world. Many of the Hungarian athletes applied for political asylum after the Games, some staying in Australia and others like Ervin Zador going to the USA.

2.1.19 Heritage Listing

2.1.19.1 Heritage Victoria

Victorian Heritage Register (VHR) Number: H1977
Listing Authority: Heritage Victoria
Heritage Overlay Number: HO900
Heritage Status / Level of Significance: International

2.1.19.2 National Trust

Name: Former Olympic Swimming Stadium
Level: National
File Number: B4635
Classified: 06/03/1980
Revised: 06/08/2001

2.1.19.3 Australian Institute of Architecture

Nationally Significant 20th- Century Architecture (2005)
Name: Olympic Swimming Stadium (former)
Classified: 2005
Revised: 22/04/2011

2.2 Assessment of Significance

2.2.1 Historical significance

The former Olympic Swimming & Diving Stadium is of historical significance as the only major stadium structure remaining from the 1956 Olympic Games.

It was the first enclosed swimming and diving stadium for the Olympic Games.

The stadium was a major focus of activity during the Olympic Games. After its first modification it became Melbourne's major entertainment centre and the stadium became synonymous with Victorian men's basketball during the NBL's boom period as well as hosting many popular concerts.

It is of architectural/structural engineering significance as an early and influential landmark in the development of Structuralist architecture in Australia in the post-war period. The winning design was acclaimed as a brilliant and original design that would be influential in Australia and overseas. To quote Robin Boyd, 'The two climatic buildings of the period are on opposite sides of the Yarra River at Swan Street Bridge: the Olympic Pools building and the Sydney Myer Music Bowl-symbolically, popular palaces of sport and culture respectively. These buildings had in common two elements: tensile construction and Bill Irwin, an engineer with the courage of his architects' convictions. As well they had the essential ingredients of the Melbourne school: a

great structural-functional idea carried out with an enforced austerity and a voluntarily cavalier approach.'[35]

2.2.2 Historical Individuals or Associations

The 'Blood in the water' incident that occurred during the Hungary Soviet Union water polo match made headlines around the world. The swimmers Murray Rose and Dawn Fraser became stars at the 1956 Olympic Games and went on to further triumphs. Kevin Borland, Peter McIntyre and John and Phyllis Murphy built successful architectural practices based on their early success in winning the competition for the Stadium. Borland and McIntyre both became professors of architecture later in their careers. Bill Irwin started his very successful engineering consultancy practice after being part of the winning team and designed the structures for many important buildings.

2.2.3 Creative and technical Achievement

The stadium's design is a superb example of form follows function, with the raking girders supporting the seating on either sides of the pools and prevented from falling outwards by being tied to the roof trusses, which are put into tension from this loading. The structure was made possible through the very early use of high-tensile steel tubing used in the trusses and is made stable by the use of 50.8 x 50.8 mm steel tie rods at the ends of the trusses that take all the out-of-balance forces. The rods were prestressed to ensure that the top and bottom chords of the trusses remained in tension, for all loading conditions, thus decreasing both the size of the truss chords and their span to depth ratio. To quote Professor Freeland 'It was a building in which a totally structural idea made practical by the latest materials was developed unswervingly to a logical conclusion.'[36]

The full end wall glazing, where the glazing bars were hung from the end trusses was an early use of curtain wall glazing.

2.2.4 Research Potential

A fire at McIntyre Partnership Pty Ltd.'s office destroyed the architectural plans for the original stadium; research to see if there were plans in any other location would be valuable. Fortunately Irwinconsult still have the structural drawings on microfilm.

Research could also identify whether this was the first building in Melbourne to utilize the use of high-strength steel and whether it was the first use of prestressing to reduce the volume of steel in the structure.

The stadium is an excellent example of adaptive reuse of a heritage listed building and a study of this aspect of the building's life, including the many different uses that it has had, would be very useful.

[35] From an article written by Boyd 'The State of Australian Architecture,' Architecture in Australia, June 1967

[36] *Architecture in Australia, a History* J.M.Freeland, p293

2.2.5 Social

The stadium has played an important part not only in Melbourne's sporting history but also in its cultural history. On 2 December a free orchestral concert, sponsored by the Sydney Myer Trust, took place, the first time the stadium was used for live entertainment purposes. The concert combined the Victorian and Sydney symphony orchestras under the baton of Sir Bernard Heinze. The 167 musicians performed on a specially constructed floating stage, and the concert opened with Handel's *Water Music.*

Other uses ranged from a mass baptism of Jehovah's Witnesses to the annual Garden Week exhibition, with the pool drained to enable potted trees and shrubs to be displayed on its floor.

Between 1983-1998, when the stadium became the Melbourne Sports & Entertainment Centre it was used for a variety of indoor sporting activities ranging from badminton to dressage, as well as being the main stadium for the NBL basketball competition. Many popular music concerts were held during this period, including performances from Elton John, Rod Stewart, Engelbert Humperdinck, Shirley Bassey and the appropriately named, Australian Crawl.

2.2.6 Rarity

The Stadium is the only major building specifically built for the Olympic Games that is still extant.

In 1981 Peter McIntyre said that the stadium was the first post-tensioned high tensile steel-framed building in Australia and in 2012 he said 'it was the first time in the world that post-tensioned high-tensile steel was used in this manner'. If this is the case the stadium has a high rarity value.

Few if any aquatic stadia have so clearly expressed the function of the building

2.2.6 Representativeness

The stadium, together with the Sydney Myer Music Bowl (for which Bill Irwin was also the engineer), represents the high point in Structuralist architecture in Melbourne.

2.2.8 Integrity/intactness

The main exterior of the building and its structural framing are intact, clearly exhibiting the form of the stadium. The seating on either side of the main pool is still in place but the pool has been covered. The diving pool has been converted into a 25m lap pool and adjoining hydrotherapy spa. A mezzanine has been installed to house a gymnasium.

The glazing to the end walls has been restored so that once again the interior of the building is flooded with light as originally intended.

3 Statement of Significance

The former Olympic Swimming and Diving Stadium is of historical, architectural and engineering (technological) significance.

It is the only major stadium structure that was purpose built for the 1958 Olympic Games that still remains. It was a major focus of activity during those Olympics.

Architecturally it represents the high- point of Structuralist architecture in Melbourne and was an early influential landmark in the Australian post-war period.

The stadium is of engineering (technological) significance as an early and rare example of prestressed, high-tensile steel frame construction. Balancing the forces by tying the outward sloping girders, supporting the seating on either sides of the pool, to the roof trusses was a brilliant structural solution. This, together with the use of high-tensile steel for the trusses, resulted in a very economical method of framing the building.

4 Area of Significance

The building is on international significance.

5 Interpretation Plan

5.1 General Approach

The ceremony should be held sometime between the 27th of November and the 7th of December as between these dates, 60 years ago, was when the stadium was used for Olympic Games events.

People to be invited should be Brian Morris, the CEO of Melbourne & Olympics Parks Trust the owners of the stadium, Peter McIntyre, Phyllis Murphy, Phil Gardiner the managing director of Irwinconsult, someone from the Australian Olympic Committee, Swimming Australia, a representative from the Collingwood Football Club (the tenants of the stadium) and an EA representative.

5.2 Possible Interpretation Themes for the Interpretation Panel

- Commemorate the 60th anniversary of the Melbourne 1958 Olympic Games. This might include the results that Australia achieved in the swimming.
- The engineering significance of the stadium as an early and unusual example of post-tensioned, high tensile steel framed construction.
- It is a building in which a totally structural idea made practical by the latest materials was developed unswervingly to a logical conclusion
- The architectural significance as the high point of Structuralist architecture in Australia
- The names of the designers, the four architects and Bill Irwin the engineer.
- The name of the builder McDougall& Ireland.

5.3 Preliminary Design of the Panel

To be added when the design is completed and approved.

6 References

Michael Taylor Architecture & Heritage, Conservation Management Plan for the former Olympic Stadium,

The Official Report of the Organising Committee for the Games of the XVI OLYMPIAD, Melbourne 1956.

The Victorian Heritage database report, Olympic Swimming Stadium.

Australian Institute of Architects', Nationally Significant 20th-Century Architecture, Olympic Swimming Stadium (former).

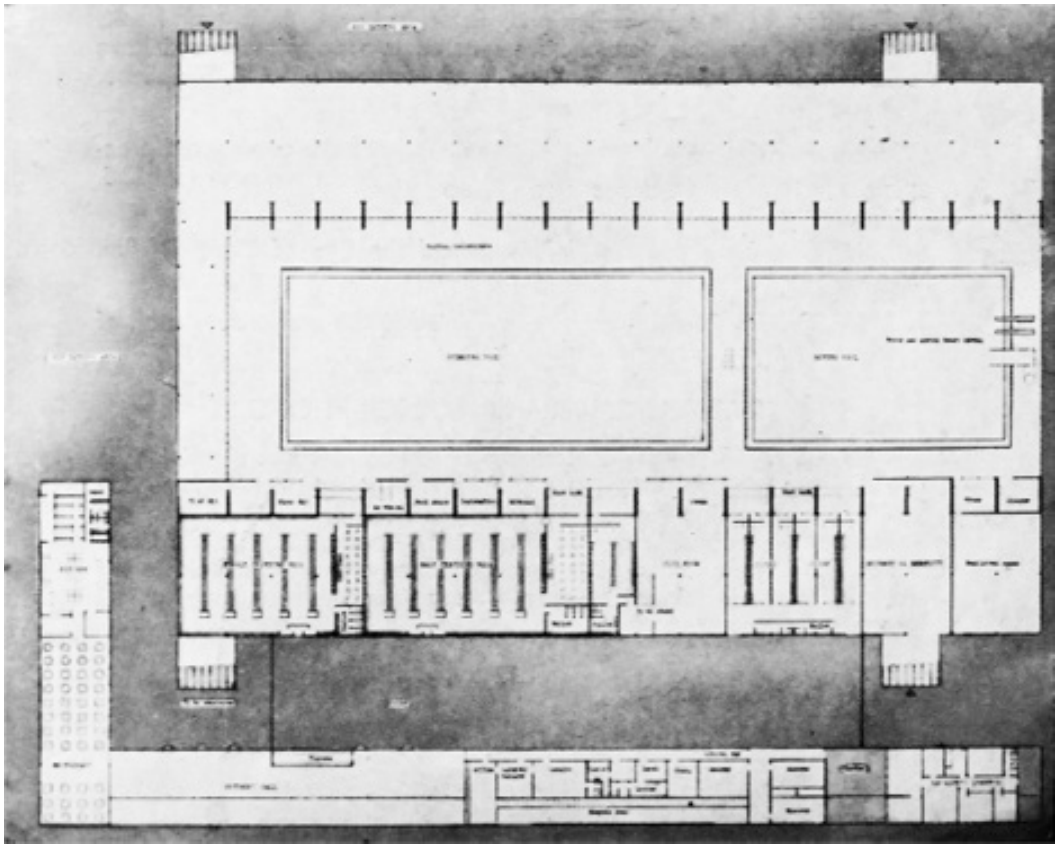
National Trust Former Olympic Swimming Stadium, Statement of Significance.

Kevin Borland: architecture from the heart, edited by D. Evans with H.C. Borland & C. Hamann

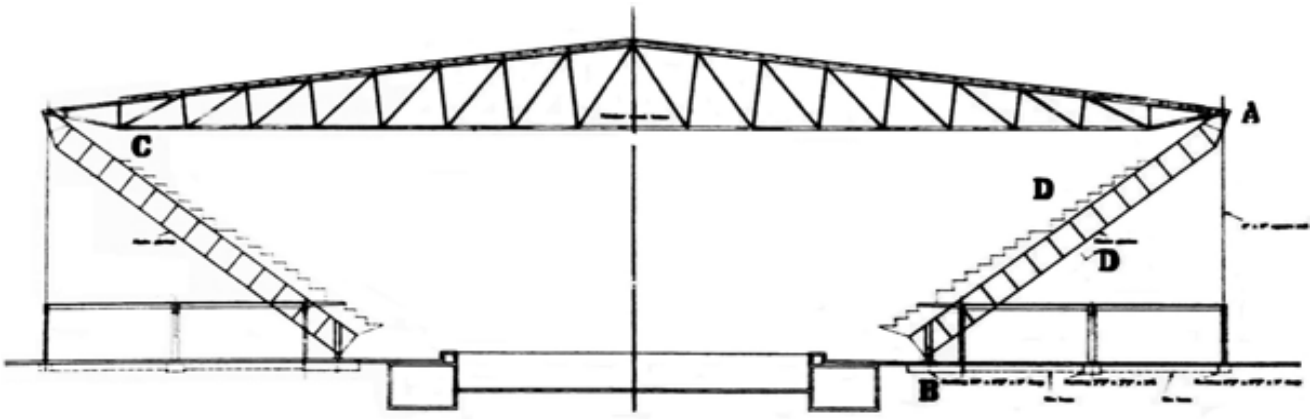
Robin Boyd: A Life, Geoffrey Searle.

1956 Olympic Architecture and the forgotten entries, David Islip, investigation program, 1995, University of Melbourne.

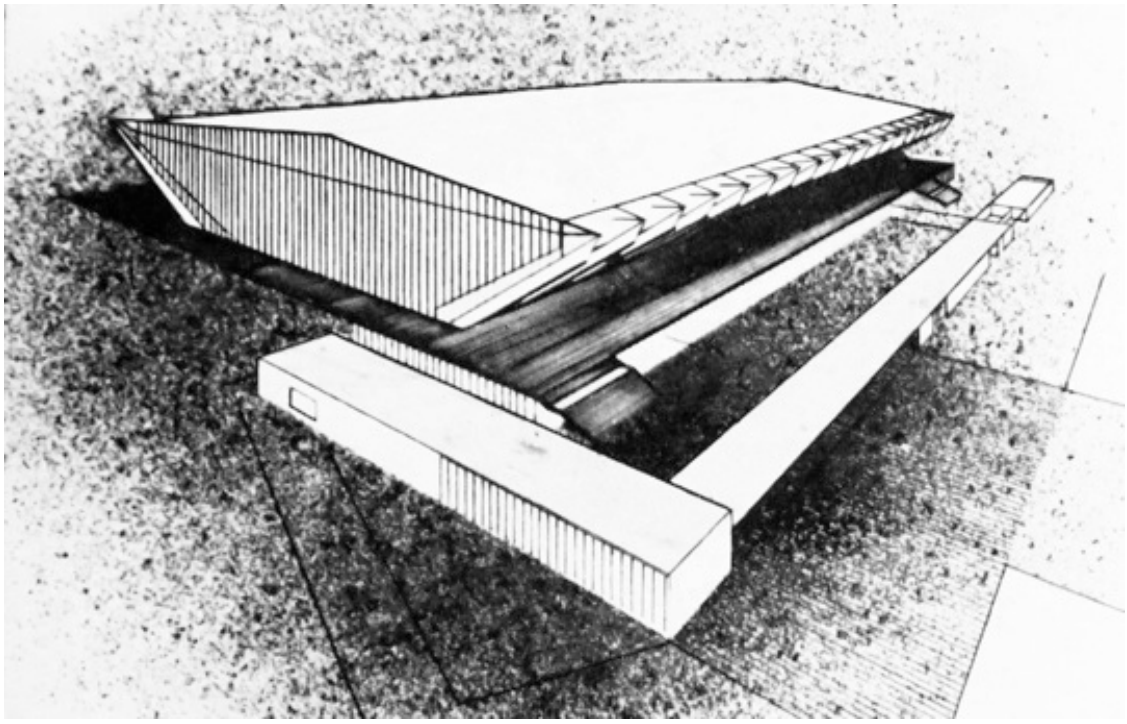
7 Plans



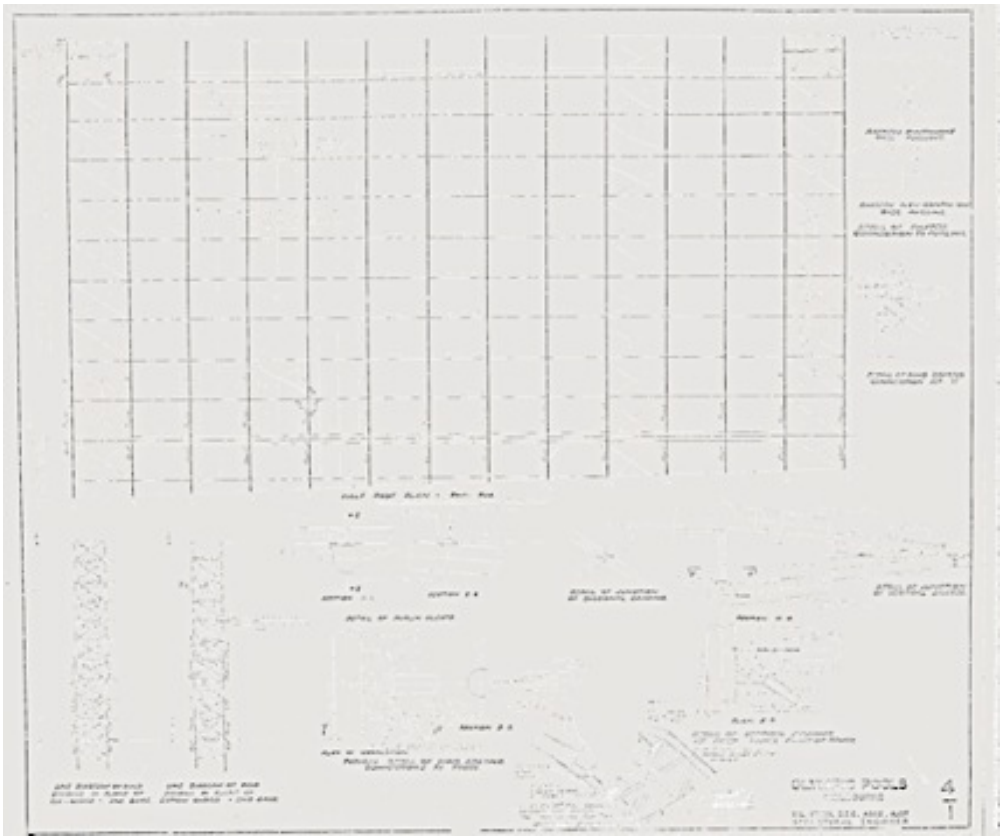
Plan of 1952 winning entry for the Olympic Pool competition:
RVIA Bulletin, December1952–January1953, p9



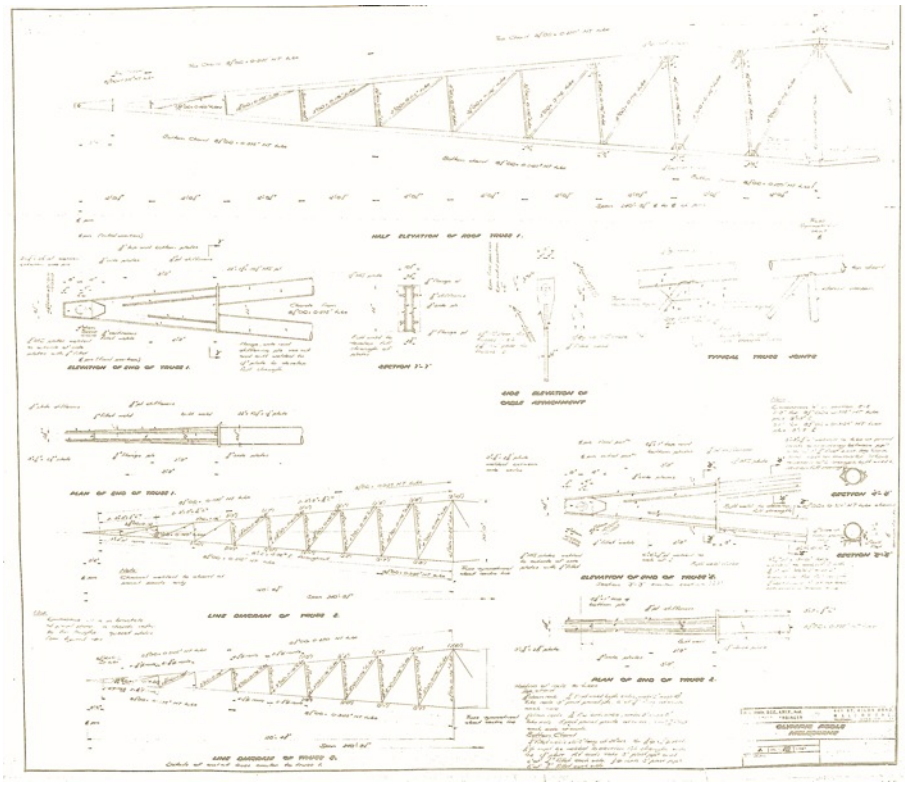
Cross-section of the winning design for the Olympic Pool, competition:
RVIA Bulletin, December1952–January1953, p 9



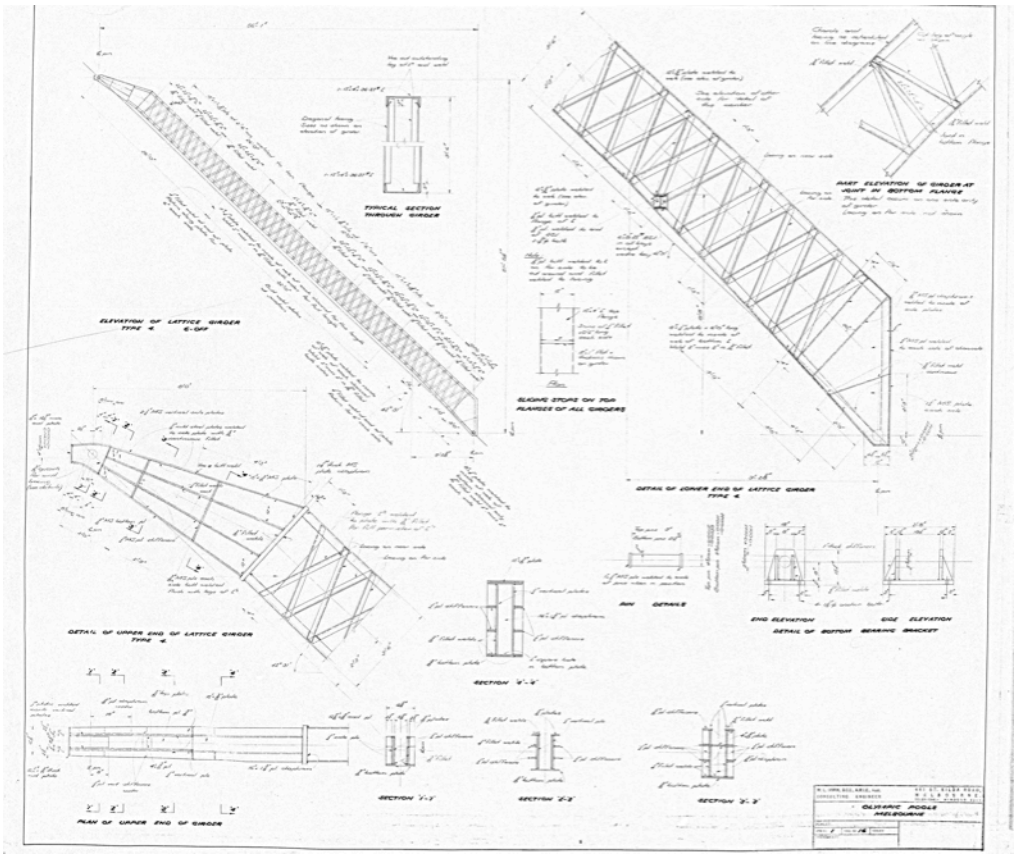
Ariel view of 1952 winning entry Olympic Pool competition:
Architecture, July 1953, p79



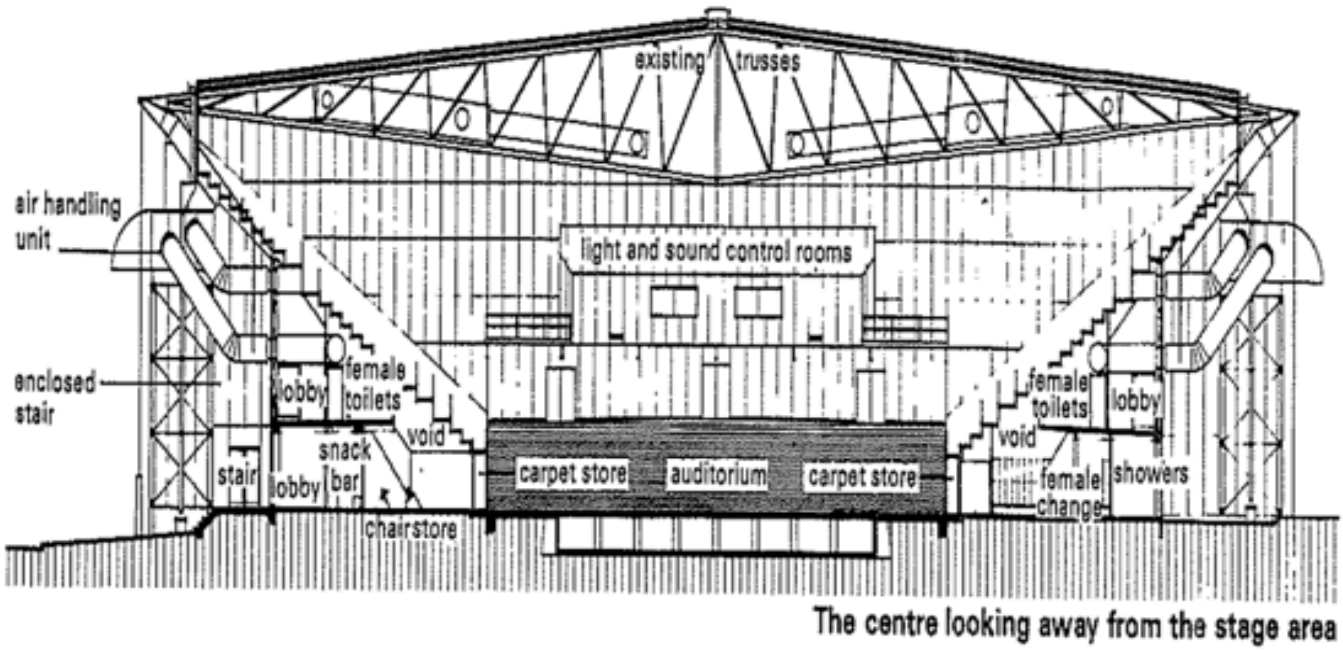
Roof Framing Plan Drawing S4-1
W.L. Irwin BCE AMIE, Structural Engineer



Truss details Drawing S18

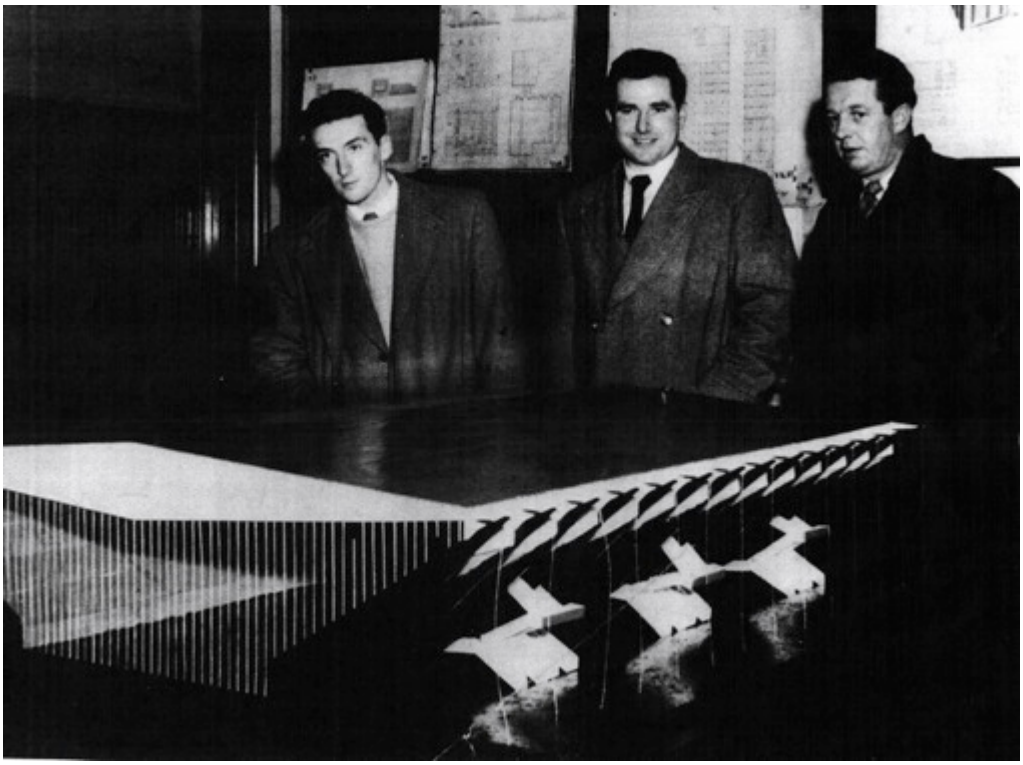


Lattice Girder and details: Drawing S10

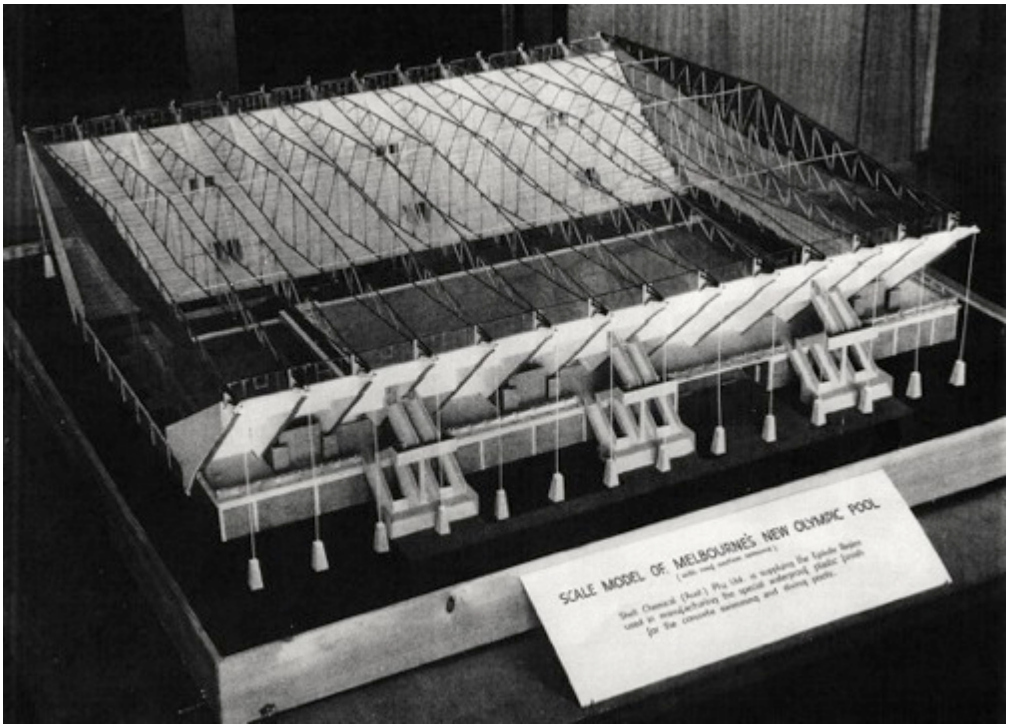


Cross-Section of Stadium after 1st modification
Engineers Australia 19 August 1983, p29

8 Photos & Map With Captions

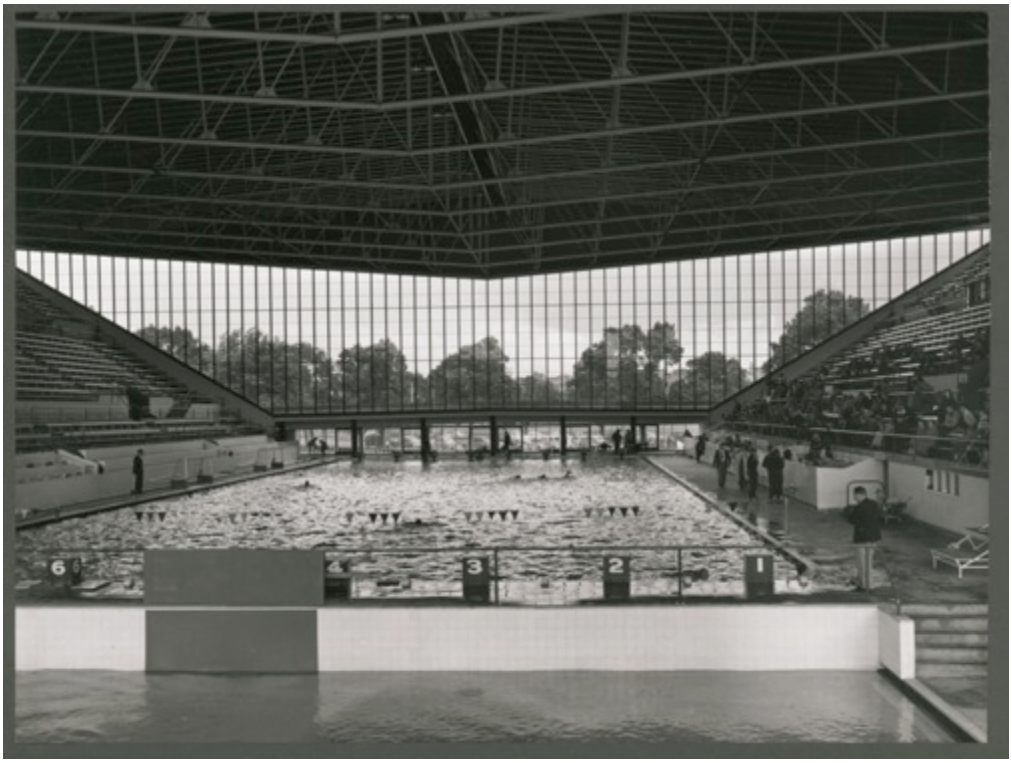


Peter McIntyre, Kevin Borland & Bill Irwin with scale model
Photo: Phyllis Murphy collection



Scale model of stadium
Photo; Phyllis Murphy collection

Steelwork erection
Photo: Peter Willie, SLV picture collection



View of pool as it was in 1956
Photo: Wolfgang Seivers, SLV picture collection

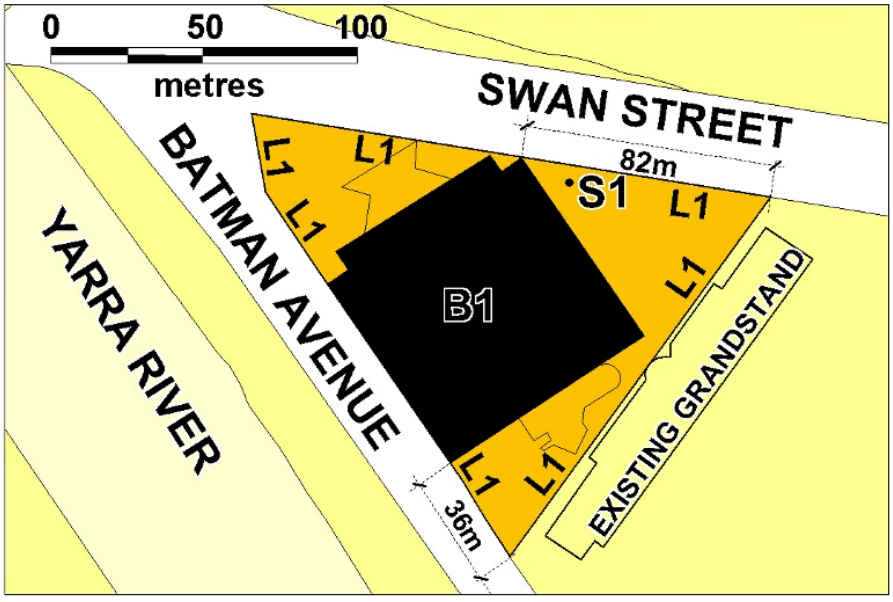
Diving tower
Photo: Getty Images, The LIFE Picture Collection

Connection detail of trusses, girders and tie rods
Photo: David Beauchamp

Lateral trusses in blue and added transfer truss in yellow
Photo: Zhiwen Cai

Top and bottom chord bracing to end bay
Photo: Zhiwen Cai

Olympic Park showing its parkland setting adjoining the Yarra River. Also its proximity to the city. The arenas are—(S) Swimming, (F) Football, (H) Hockey, and (C) Cycling. (T) is Transport Park.
Photo 1956 Olympic Games Official Report, p41



Map of location of Olympic Swimming and Diving Stadium
From Heritage Victoria Database Report
H1977 former Olympic Pool

9 Appendix 1: Biographies

9.1 Kevin Borland

Kevin Borland was born in Melbourne on 28 October 1926. He was influential in post-war Australian architecture. His initial works, the Rice House and the Olympic Swimming and Diving Stadium, were examples of Structuralist architecture; his later works were influenced by his belief in participatory design resulting in rough-and-ready timber architecture such as the low-cost timber buildings at Preshil. These beliefs resulted in a baroque, ad hoc celebration of vigorous structural and functional expression which was especially attuned to bush sites and the exploratory lifestyles of the 1970s.[37] Much of his significant works, such as the Harold Holt Swimming Pool, were composed of raw materials and were considered 'Brutalist' typifying his renowned motto 'architecture is not for the faint-hearted.'

He was 12 years old when he first attended University High School in Parkville, leaving 3 years later when offered a job as an office hand in the studio of Best Overend, a pioneer of modernist architecture in Melbourne. The same year he started part-time study at Melbourne Technical College studying Building Construction and Geometrical Drawing. In 1944 Borland started a Bachelor of Architecture degree at the University of Melbourne. After completing the first year he withdrew to join the Royal Australian Naval Reserves. He was mobilized in July 1945, a month before the Japanese surrender and demobilized in January 1947, returning to the Architecture School to study under the newly appointed tutors Roy Grounds and Robin Boyd. During his time at university he was an active member of both the University branch of the Communist Party and the Labour Club.

After completed his degree in 1950 he worked briefly for Lester Bunbury, a furniture and interior designer, before working for Harry Seidler in Sydney. Returning to Melbourne in 1951 he, together with Peter McIntyre, rented office space in the basement of 1 Drummond Street, Carlton, a building owned by John and Murray Daly consulting engineers. Mockridge, Stahle and Mitchell, architects, occupied the top floor. In 1952 he became Robin Boyd's assistant in the RVIA Small Homes Service during Neil Clerehan's absence

After winning the Olympic Swimming and Diving Stadium competition at the end of 1952 he set up a joint office with the other members of the winning team to prepare the drawings and supervise the construction of the stadium. Between 1957 to 1965 he went into partnership with Geoffrey Trewenack, then practiced on his own until about 1980 when he went into partnership with Bernard Brown. This partnership undertook the design for the first alteration to the Olympic Swimming & Diving Stadium.

In 1981 Kevin Borland was appointed as the Foundation Professor of Architecture at Deakin University but when the University failed to renew his contract at the end of 1983 he refused to re-apply for the position. His students strenuously opposed his removal but to no avail.

[37] *Melbourne Architecture,* Philip Goad, p187

He then took up a series of short-term academic appointments in New South Wales, Launceston and Western Australia. In 1985 he took a two-year appointment as Director of Architecture for the Building Management Authority of Western Australia. In 1986 he married for the second time to Huan Chen Tan, an architect and previous student from Deakin. In 1987 they returned to Melbourne where their life together and their architectural partnership lasted until Borland's death in 2000.

Over the course of his career he won many architectural awards, which are listed below.

Awards

- RAIA Victorian Architectural Medal for Outstanding Building, 1972. School Hall at Preshil (Junior Campus), Kew (1962).
- RAIA Victorian Chapter, Citation in the Public Buildings category, 1969. Harold Holt Memorial Swimming Centre, Glen Iris (1968–69).
- RAIA Victorian Chapter House of the Year, 1972. Paton House, Portsea (1970).
- RAIA Victorian Chapter, Bronze Medal in category 'House of the Year', 1974. Nichols House, Eltham (1973).
- RAIA Victorian Chapter, Citation, 1974. Crossman Flats, Launching Place (1973).
- RAIA Victorian Chapter, Citation, 1977. New Gordon House, South Melbourne (1974–76).
- RAIA Victorian Chapter, Citation, 1978. Mount Eliza North Primary School, (1977).
- RAIA Tasmanian Chapter declared among the ten notable Tasmanian buildings of 1980. Fitzgerald House, Hobart, Tasmania (1979).
- RAIA Victorian Chapter House of the Year, 1984. Roger Evans Residence, Queenscliff (1983).
- RAIA Victorian Chapter award for Outstanding Architecture in residential alterations, 1991. Borland Residence, Newport (1989–90)
- Dulux Colour Award for Residential Building and 'Belle' magazine Colour bond Steel Award, 1994. 10 x 1 bedroom housing units for Ministry of Housing, Collingwood.

9.2 William (Bill) Lyle Irwin

Bill Irwin was born in Ballarat in 1917, he commenced his engineering education at the Ballarat School of Mines in 1938, but after the outbreak of the Second World War he joined the Royal Australian Engineers, working first on the Alice Springs to Darwin road and then on other engineering projects in the South East Pacific. After the war he completed a Bachelor of Engineering degree at the University of Melbourne and then commenced work with the consulting engineers John and Murray Daly. Kevin Borland and Peter McIntyre had an office in the same building and when they approached him about making their idea for the Olympic Swimming and Diving Stadium competition structurally workable he brilliantly solved the problem, using the roof trusses to support the inclined girders that supported the seating on either side of the pool.

In 1953 he started his own practice, W.L. Irwin Associates, in an office at 441 St Kilda Road, which he shared with the four architects who had won the Olympic Swimming and Diving Stadium competition. In 1956 he was the engineer for the Sydney Myer Music Bowl working with Barry Patten of Yuncken Freeman Architects. The design was another tensile structure where interlaced steel cables were supported by the large main cable forming the opening to the Bowl, which in turn was supported by two large steel cigar-shaped columns. The interlaced cables were clad with aluminium faced plywood panels. The structural design predates by nearly ten years noted German architect/engineer, Frei Otto, and his experiments in using lightweight tensile and membrane structures. Frei Otto's design of Munich's acclaimed Olympic Park for the 1972 Olympics, and the temporary West German pavilion at the 1967 World's Fair in Montreal, Canada, were heavily influenced by the design of Melbourne's Myer Music Bowl.[38] Robin Boyd, when commenting on the stadium and the music bowl, said, 'these two buildings had in common two elements; tensile construction and Bill Irwin, an engineer with the courage of his architects' convictions.'

The office grew from initially 3 engineers in 1953 and went on to handle a succession of notable projects with some of Melbourne's leading architects; these included: -

Academy of Science Dome, Canberra
State Government Offices Complex, Melbourne
BHP Research Laboratories, Clayton
University buildings at Melbourne Monash, la Trobe and ANU
Former BHP Headquarters
State Bank Centre
530 Collins Street-Stock Exchange
New Parliament House, Canberra

The firm had several name changes over the years and is now Irwinconsult.

In 1983 Bill Irwin retired. In his retirement he pursued a number of other business interests and gained a reputation as a careful and successful investor. He also enjoyed sailing and did some voluntary work for the community. Bill Irwin died in 2000.

9.3 Peter McIntyre

Peter McIntyre was born on 24 August 1927; he was educated at Trinity Grammar School, RMIT and graduated with a Bachelor of Architecture degree from the University of Melbourne in 1950. In the same year he started practice as an architect combining modern, high technology materials with concern for "emotional functionalism" -the impact of the built environment on its occupants. Robin Boyd lauded his 1953 design for an environmentally adapted Mallee Hospital at Beulah as the beginning of a new Australian architecture.

[38] Great Buildings.com/buildings/Sydney Myer music bowl

Another early design was the Snelleman House, or Coil House, which is heritage listed. Part of the citation for the house is that it 'is architecturally significant as one of the most celebrated of the modernist houses built in Melbourne in the early post-war period. It was an inventive response to the site, and is an outstanding and intact example of the innovative residential designs produced in Melbourne at this time, when the limited availability of materials resulted in much experimentation with materials and structures by a number of highly individual architects. It is a notable example of the geometric house designs of the period, whose geometry in this case was site-induced. It is one of the finest residential designs of the architect Peter McIntyre, one of the most innovative of the architects practising in Melbourne in the post-war period.'[39]

As already noted, in 1953 he practiced from the office at 441 St Kilda Road as part of the team preparing the drawings for the stadium and supervising its construction.

In 1954 he married Dione Beatrice Cohen and the couple then practised as Peter & Dione McIntyre & Associates. In 1955 he completed his River House on a steep section of land next to the Yarra River in Kew and where the practice is now located. In 1961 he inherited his father's architectural firm R.H. McIntyre & Associates and merged the two practices as McIntyre McIntyre & Partners Pty Ltd.

In 1972 McIntyre formed an additional partnership with George Connor and Donald Wolbrink to form International Planning Collaborative (Interplan) that won the contract to write a new Strategy Plan for the City of Melbourne. Writing the plan involved extensive consultations with all of the stakeholders, residents, business & property owners and was generally well received. Unfortunately the Kennett Government shortly afterwards sacked the Melbourne City Council, installing an administrator and much of the plan was never implemented.

His major projects include Melbourne's Parliament Station, The Jam Factory Complex in South Yarra, the Westfield Knox in Wantirna South and the creation of the Dinner Plain alpine village near Mount Hotham, Victoria. He was the Professor of Architecture at Melbourne University between 1988 and 1992 and has won numerous awards.

Peter McIntyre is still practicing as an architect.

Award and Competitions

- Victorian Architecture Awards 2014 Best Enduring Architecture'
- Institute of Architects Commendation Award 2013. Project Richard and Elizabeth Tudor Centre at Trinity Grammar
- RAIA Gold Medal 1990 awarded to Peter McIntyre
- RAIA Sir Zelman Cowen Medal 1987 Project: Dinner Plain Alpine Village, Victoria
- RAIA Merit Award 1985. Project: Parliament Station, Melbourne
- RAIA Sir Zelman Cowen Medal 1985. Project: Parliament Station, Melbourne
- RAIA Robin Boyd Medal 1983. Project: Seahouse, Victoria
- RAIA Merit Award 1980. Project: Kyla Park Housing Development, NSW
- RAIA Award 1978 Bronze medal. Project: Westfield Knox, Victoria

[39] Victorian Heritage Register H2282

- IES Meritorious Lighting Award 1978. Project: Westfield Knox, Victoria
- RAIA Urban & Community Design Bronze medal. Project: Melbourne Strategy Plan
- RAIA Architectural Projects Award 1975. Project: The Jam Factory, Melbourne
- Sir James Barrett Memorial Medal 1974 Project: Melbourne Strategy Plan
- Building of the Year 1956. Project: Olympic Swimming Pool, Melbourne
- RAIA Architecture & Arts Award 1954/55. Project: McIntyre House, Melbourne
- Architecture Arts Award 1954. Project: Snelleman House, Melbourne
- 1979 National Archives Competition finalist.
- 1969 National Gallery (Canberra) Competition finalist.
- 1958 Stawell Swimming Pool Competition 1958 winner.
- 1957 Academy of Science (Canberra) Competition 1957 finalist.
- 1952 Olympic Swimming Pool (Melbourne) Competition 1952 winner.

9.4 John & Phyllis Murphy

John Murphy was born in 1920, the son of prominent Melbourne architect Gordon Murphy. Phyllis (nee Slater) was born in 1924 the daughter of Arthur Slater. Both graduated with degrees in architecture at the end of 1949, Phyllis Slater being one of only two female graduates in that year. The previous year she had topped the class. As soon as they had graduated they set up in private practice with an office in Camberwell, one year before they were married in 1950.

In 1952 the four recent graduates worked in the Murphy's office at weekends, first on the competition for the main stadium for the Olympic Games and then on the competition for the Swimming & Diving Stadium. After winning the competition John and Phyllis decided to keep their practice separate as they had started to build up a small but expanding clientele and they wanted to keep working on their own in the future. Phyllis decided to drop out of the team and run the office while John spent a considerable amount of time working with the Borland and McIntyre.[40]

Initially their commissions were for residential work with their designs being influenced by a visit to Sweden where living spaces were small but the buildings had a simplicity that they found fresh and elegant. These houses were described by architect Neil Clerehan as modest "but their version of contemporary design was elegant and timeless."

In the 1960s they became active in the preservation of historic buildings and were foundation members and honorary architects for the National Trust. Their restoration work included the moving of La Trobe's cottage from its original site in East Melbourne to a site near the Botanic Gardens, Bacchus Mansion, Emu Bottom homestead, and the Collingwood Town Hall.

As well as restoration work they had commercial and school projects, including Fintona Girls' School and Caulfield Grammar School.

[40] *Recollections of preparing a submission for the 1956 Olympic Pool competition*, Phyllis Murphy, October 2014

They were active in the mid 1970s Collins Street Defence Movement trying, unsuccessfully to stop the demolition of historic buildings in what had been Melbourne's main street.

In 1982 they retired and moved to an historic house in Kyneton where Phyllis Murphy built up a collection of historic Victorian wallpapers. John Murphy died in 2004 and Phyllis Murphy now lives in Williamstown.

Award and Competition

- VASS prize - 1944 (Phyllis Murphy)
- Light in Architecture Competition, third prize - 1947 (John and Phyllis Murphy)
- Olympic Swimming Pool (Melbourne) Competition 1952 joint winners.
- RAIA Victorian Chapter Award (John and Phyllis Murphy) Merit Award for Outstanding Building Restoration, Collingwood Town Hall (John and Phyllis Murphy, in association with Peter Lovell)-1982
- RAIA Life Fellow - 2009 (Phyllis Murphy)
- Honorary Doctorate: Doctor of Architecture, Honoris Causa - University of Melbourne, 2014 (Phyllis Murphy)

9.5 Norman Mussen

Norman Mussen was born in 1909, educated first at Wesley College and then studied engineering at Melbourne University, finally completing his degree after what family history records as six years of championship tennis, bridge, chess and riotous living.

In 1936 he started practicing as a consulting engineer, opening an office at 375 Collins Street. His clients included the architects Eric Beedham and Marcus Barlow, for whom he designed the structure for the eleven-storey reinforced concrete framed *Century Building* on Swanston Street. He was the structural engineer for the Percy Everett designed Russell Street Police Headquarters (1940-43).

In 1946 he shared an office with the architect Keith Mackay at 383 Latrobe Street where they worked on projects for Associated Pulp & Paper Mills Ltd and in 1950 they formed the firm Mussen & Mackay, which later became Mussen, Mackay & Potter when engineer Charles Potter joined the firm. The firm had, during its early years, an informal association with the private practice of Roy Grounds, who in his capacity as senior design tutor invited Mussen to lecture on structural engineering to architectural students at the University of Melbourne. In his lectures he had a completely different way of teaching the theory of structures, having his students analysing the stresses in buildings, rather than using set formulae to design columns, beams and slabs. He also introduced students to the new construction technique of prestressed concrete. In his lectures he stressed the importance of finding ways to reduce the amount of material in a building by balancing the forces in a building. This was the basis of the four architects winning design for the Olympic Games stadium. Mussen, Mackay & Potter also entered this competition and were one of the four firms awarded a consolation prize of £400.

When Mussen Mackay & Potter were awarded the designing and building of the John Curtin School of Medical Research in Canberra in 1953, Mussen moved his family to Canberra where he set up on own his as a consulting engineer.

One of the last projects he worked on was the Roy Grounds designed National Gallery of Victoria. Hamish Ramsay, a former student and Roy Grounds stepson worked in his office and on Mussen's death in 1967 took over the practice. In 1969 Hamish Ramsay decided to move to Adelaide and sold his practice to David Beauchamp. As the structural drawings for the NGV came with the practice this enabled Beauchamp's firm to undertake the structural design of later alterations to the NGV, including the Peter Sanders designed roofing of the Murdoch Court and, in association with Arup, the structural work for the 1999-2003 Mario Bellini designed $161.9 million redevelopment of the Gallery.

10 Appendix 2: Letter of approval from Melbourne & Olympic Parks Trust

MELBOURNE & OLYMPIC PARKS

MELBOURNE & OLYMPIC PARKS
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22 June 2016

Mr David Beauchamp
159 Arnold Street
Princes Hill VIC 3054

Dear Mr Beauchamp,

Thank you for your letter of 16 May.

The Trust approved, in principle, the proposal to apply for Engineering Heritage listing of the 1956 Olympic Swimming Pool and the installation of a plaque and interpretive panel.

I would welcome the opportunity to meet with you in the coming weeks to discuss how you would like to proceed. My assistant Dee will be in touch to schedule a time for us to meet.

Yours sincerely,

Brian Morris
Chief Executive Officer

Authorship

This document was written by:
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